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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,340	03/31/2004	Jeffrey Bogart	ASMNUT.002A	8833
20995	7590	12/21/2005	EXAMINER	
KNOBBE MARTENS OLSON & BEAR LLP			WILKINS III, HARRY D	
2040 MAIN STREET			ART UNIT	
FOURTEENTH FLOOR			PAPER NUMBER	
IRVINE, CA 92614			1742	

DATE MAILED: 12/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/816,340

**Applicant(s)**

BOGART ET AL.

**Examiner**

Harry D. Wilkins, III

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) 1-30 and 45-58 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 31-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### **Status**

1. The rejection of claims under 35 USC 112, 2<sup>nd</sup> paragraph has been withdrawn in view of Applicant's amendments to claims 35 and 36.
2. The rejection grounds based on (either) Nagahara reference or Oliver have been withdrawn in view of Applicant's amendments to claims 31 and 39 adding the electrode.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 31, 32, 35, 36, 37 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Nagahara et al (US 5,931,719) OR Nagahara et al (US 5,816,900) and in view of Liu et al (US 6,004,880).

('719) Nagahara teaches (see figures 2A, 3A and 5 and related descriptions) an apparatus including a wafer carrier holding a wafer, a chamber having an upper opening

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and a compressible and flexible pad x08 having a polishing surface x04 and fluid channels x06 and x09, wherein the pad is placed between the upper opening of the chamber and the wafer, wherein the pad is configured to bow outward and therefore apply more pressure at the center when a pressure in the chamber increases.

('900) Nagahara et al teach (see figure 2 and col. 4, line 60 to col. 5, line 40) an apparatus including a wafer carrier 26 holding the wafer 12, a chamber 28 with an upper opening and a compressible and flexible pad 16 having a polishing surface and fluid channels 24 placed between the upper opening and the face of the wafer, wherein the pad is configured to bow (flex) and apply more pressure near the center as the pressure in the chamber increases.

Neither Nagahara et al reference teaches using the apparatus for electrochemical mechanical deposition or polishing.

Liu et al teach (see abstract) a method of electrochemical mechanical deposition and simultaneous polishing of semiconductor wafers. This has the advantage of being only one step instead of multiple steps of electrochemical deposition followed by mechanical polishing.

Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the pad of Nagahara et al to be used in an electrochemical mechanical process as disclosed by Liu et al because integration of electrodes in a CMP apparatus allow for one step processing instead of two steps.

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When performing the electrochemical mechanical process of Liu et al, it would have been obvious to have added an electrode touching the process solution to apply a potential difference in order to enable the electrochemical portion of the process.

Regarding claim 32, ('719) there is a perforated and flexible support plate x10 placed under the pad. ('900) Nagahara et al teach a manifold 22 which is a perforated and flexible support plate under the pad.

Regarding claims 35 and 36, neither Nagahara et al reference teaches adding a pressure sensor in fluid communication with the solution chamber. However, since Nagahara et al teach (see col. 3, lines 21-31) that the pressure of the fluid in the chamber was varied and affected the pressure applied by polishing pad, one of ordinary skill in the art would have found it obvious to have added a pressure sensor and a flow rate controller (i.e.-a control valve) in order to control the pressure applied by the pad to the wafer.

6. Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Nagahara et al (US 5,931,719) OR Nagahara et al (US 5,816,900) in view of Liu et al (US 6,004,880) as applied above to claim 31 and further in view of Landau (US 6,261,433).

The teachings of both Nagahara et al references are described above.

Neither Nagahara et al reference teaches adding a porous membrane in the chamber under the pad or support plate.

Landau teaches (see col. 13, lines 32-59) adding a porous ceramic barrier in a semiconductor processing apparatus for the purpose of ensuring that flow of fluid is uniform across the entire cross section:

Therefore, it would have been obvious to one of ordinary skill in the art to have added a porous membrane to the apparatus of Nagahara et al for the purpose of improving the uniformity of fluid flow across the entire cross section of the wafer.

7. Claims 39, 40, 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oliver (US 5,876,271) in view of Maget (US 4,522,698) and Liu et al (US 6,004,880).

Oliver teaches (see figures 3a, 3b, 6a and 6b and related discussion) an apparatus including a wafer carrier 310 holding a wafer 302, a chamber for supplying slurry to the wafer surface having an upper opening, and a compressible pad 306 placed between the upper opening of the chamber and the wafer surface.

However, Nagahara et al do not teach an apparatus wherein the upper opening of the chamber is defined by extendable side walls that expand and contract with respect to the pressure of the fluid in the chamber so that the pad applies a uniform pressure on the wafer surface.

Maget teaches (see figure 1 and col. 4, lines 1-10) adding a bellows structure 56 to the end of a chamber and an end plate 58. The bellows reacts by expanding and contracting in response to changes in the pressure of the fluid in the chamber. The rigid end plate is capable of pushing uniformly across its face.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a bellows structure as taught by Maget to the end of the chamber of Oliver because the bellows structure would have allowed the polishing pad to apply a uniform pressure across the entire cross-section of the wafer. Oliver teaches (see col. 8, lines 17-29) a desire to maintain a uniform pressure across the polishing pad surface. Thus, by adding the bellows structure of Maget, the pressure would have been made more uniform. [On a side note, it is not so much the pad configured such that as the pressure of the polishing solution increases, the extendable sides walls push the polishing surface against the conductive face, it is more accurately the solution chamber (with its extendable side walls) that is configured to operate in the claimed fashion.]

Neither Oliver nor Maget teach using the apparatus for electrochemical mechanical deposition or polishing.

Liu et al teach (see abstract) a method of electrochemical mechanical deposition and simultaneous polishing of semiconductor wafers. This has the advantage of being only one step instead of multiple steps of electrochemical deposition followed by mechanical polishing.

Therefore, it would have been obvious to one of ordinary skill in the art to have adapted the pad of Oliver to be used in an electrochemical mechanical process as disclosed by Liu et al because integration of electrodes in a CMP apparatus allow for one step processing instead of two steps.

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When performing the electrochemical mechanical process of Liu et al, it would have been obvious to have added an electrode touching the process solution to apply a potential difference in order to enable the electrochemical portion of the process.

Regarding claim 40, Oliver teaches (see figure 6a and related description) placing a stainless steel polishing diaphragm 606 which is perforated.

8. Claims 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oliver (US 5,876,271) in view of Maget (US 4,522,698) and Liu et al (US 6,004,880) as applied above to claim 39 and further in view of Landau (US 6,261,433).

The teachings of Oliver and Maget are described above.

Neither Oliver nor Maget teach adding a porous membrane in the chamber under the pad or support plate.

Landau teaches (see col. 13, lines 32-59) adding a porous ceramic barrier in a semiconductor processing apparatus for the purpose of ensuring that flow of fluid is uniform across the entire cross section.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a porous membrane to the apparatus of Oliver for the purpose of improving the uniformity of fluid flow across the entire cross section of the wafer.

### ***Response to Arguments***

9. Applicant's arguments filed 14 November 2005 have been fully considered but they are not persuasive. Applicant has argued that Liu et al gives no motivation to alter the systems of either Nagahara et al reference or Oliver.



In response, the Examiner respectfully disagrees. CMP (chemical mechanical polishing) and ECMP (electrochemical mechanical polishing) systems have been known in the art to utilize identical pad structures, with the ECMP systems merely utilizing an electrode in addition to the pad. As such, Liu et al provided the motivation to alter the system of Nagahara et al or Oliver to be used for an ECMP process to achieve more uniform polishing. The alteration would merely be the addition on an electrode into the system in contact with the electrolyte.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

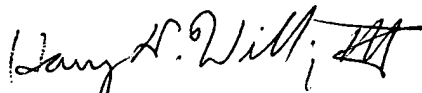
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Harry D Wilkins, III  
Examiner  
Art Unit 1742

hdw